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SURFACE WATER AND GROUNDWATER CONJUNCTIVE USE MANAGEMENT SANTA CLARA COUNTY, CALIFORNIA

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INNOVATION IN WESTERN WATER LAW AND MANAGEMENT
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I. SUMMARY

Over half of the water used in Santa Clara County is naturally or artificially recharged groundwater. Santa Clara Valley Water District's (District) conjunctive use system of operating facilities and management practices integrates surface water and groundwater to provide a flexible and reliable water system (see Figure 1). Future plans to augment, protect, and efficiently manage water quantity and quality incorporate potential reductions from numerous consecutive years of drought, increasing water quality restrictions, restrictions on imported water quality and quantity, and a vulnerable water system during disasters.

II. SANTA CLARA COUNTY, CALIFORNIA

A. Santa Clara County , as shown in Figure 2, is located at the southern end of the San Francisco Bay. It is one of the nine counties which make up the San Francisco Bay Area. The valley is bordered on the west by the Santa Cruz mountain range which separates the valley from the Pacific Ocean, on the east by the Diablo Mountain Range, on the north by San Francisco Bay, and on the south by the Pajaro River.

B. Santa Clara County covers 1,330 square miles and includes 15 cities with a total population of 1,500,000 (see Figure 3). The highly urbanized northern area, referred to as Silicon Valley, is the center of high technology industries such as computers, electronics, communications, and defense.

The largest employers include Lockheed Missiles and Space Company, Hewlett-Packard Company, IBM, Apple Computer, and FMC Corporation. The southern area of the county is urbanizing slower with reserved greenbelts, agriculture, and some "ranchettes" surrounding two cities.

C. The climate is semi-arid with an average of fourteen inches of rain falling in the winter.

D. Figures 4 and 5 list the 400,000 acre-feet of countywide water use by groundwater (216,000 acre-feet), treated water (102,000 acre-feet), Hetch Hetchy (77,000 acre-feet), and surface water (5,000 acre-feet) and type of use, approximately 47% residential, 30% commercial, 15% industrial, and 8% agricultural. Countywide, more than half of the water used is groundwater, and residential use is the highest percentage of use.

III. SANTA CLARA VALLEY WATER DISTRICT

A. Figure 6 lists general information about Santa Clara Valley Water District.

B. Santa Clara Valley Water District is a special district created by State of California legislation and responsible for water supply and flood control within Santa Clara County.

C. The District is governed by a seven-member board of directors, five of whom are elected and two appointed by the Santa Clara County Board of Supervisors.

D. The District is the water wholesaler within the county and currently supplies seven city-owned, one privately owned and two investor owned water retailers.

IV. CONJUNCTIVE USE

A. Conjunctive use management (Figure 7) in Santa Clara County is the joint use of surface water and groundwater to provide a more flexible and reliable distribution system. Figure 8 displays not only the facilities to distribute and treat water but also a picture of a recharge system. Ponds adjacent to recharge areas in natural creeks are supplied local water from reservoirs and imported water from pipeline turnouts.

B. The groundwater basins serve as both treatment and transmission facilities. The District recharges surface water through streams and percolation ponds in the forebay; water retailers pump potable water from wells throughout the groundwater basin and distribute directly to the consumer. The groundwater does not need to be treated before reaching the consumer.

C. As water demands increase, the groundwater basin is no longer able to safely supply the full demand. The District imports water from outside the county to treat at water treatment plants and recharge into the groundwater basins.

D. Thus, the imported water reduces the annual demand on the groundwater basins and increases the available water to

replenish the groundwater basins for future dry years.

E. Depending upon the water supply conditions, the pricing policy can encourage or discourage the use of groundwater as discussed later.

V. IMPORTED WATER SOURCES (Figure 9)

A. About sixty percent of the projected ultimate water supply in Santa Clara County is imported into the county through the three sources shown in Figure 10: the State of California Water Project, the federal Central Valley Project, and the City of San Francisco's Hetch Hetchy System.

B. As shown in Figure 11, both the state and federal water projects collect runoff in reservoirs to the north of the Sacramento-San Joaquin Delta (Delta), release water into the Sacramento River, and divert water from the Delta. Thus, the major focus of California water projects is the Delta.

C. Two-thirds of California's water originates north of Sacramento while seventy percent of the population is south of Sacramento.

D. The State of California Department of Water Resources operates the State Water Project. The state's delivery contracts exceed the water project's physical ability to deliver that quantity of water. The contracts are based on a complete state water project, including the construction of a conveyance facility from the Sacramento River to the southern end of the Delta.

E. The federal Central Valley Project (CVP) is operated by the Bureau of Reclamation (Bureau). Although the Bureau has greater reservoir storage than the state's system, conveyance restricts water deliveries. Due to recent changes in the Bureau's proposed pricing policies, the Bureau is assessing high interest penalties when contract payments do not reimburse operations and maintenance costs plus interest on capital improvements. This greatly affects the District's cost of imported water.

F. Figure 12 is a map of the Delta waterways. Fresh water is released from reservoirs into the Sacramento River to the north of the Delta. The state's Harvey O. Banks Pumping Plant and the Bureau's Tracy Pumping Plant in the southern end of the Delta pump water into facilities heading south.

G. The State Water Resources Control Board (State Board) holds the primary responsibility for water quality within the San Francisco Bay and the Sacramento-San Joaquin Delta. After withdrawing a 1988 draft plan, which is strongly criticized by fisheries, environmentalists, urban and agricultural water users, the State Board now anticipates new water quality standards in 1993. These standards directly impact the quantity and quality of water available to the water users, on both the state and federal systems, south of the Delta.

H. The Hetch Hetchy system, owned and operated by the City and County of San Francisco, transports water from the

Yosemite area to San Francisco. Hetch Hetchy also sells potable water in Santa Clara County to six city water retailers.

I. Although the District does not control the Hetch Hetchy water deliveries in Santa Clara County, Hetch Hetchy is a very important source of water within the county. All District water supply master plans include the future projections of the Hetch Hetchy supply in the county.

VI. GROUNDWATER RECHARGE PROGRAM (Figure 13)

A. The District manages three interrelated groundwater basins (see Figure 14) which are geologically defined. The District's conjunctive use system is structured around these groundwater basins to augment the natural water supply with facilities and management practices. The District plans and operates the conjunctive use facilities to maximize artificial recharge to the groundwater basins when supply is available to provide a cushion against droughts.

B. These basins are artificially recharged with both imported water and locally conserved reservoir water. The District builds gravel dams each spring to retain water released into the streams and into ponds from upstream reservoirs or turnouts from imported water pipelines.

C. In Santa Clara Valley and Coyote Groundwater Basins, the streams flow north to the San Francisco Bay. In Llagas Groundwater Basin, the streams flow south to Pajaro River.

The boundary between the forebay and confined areas in both the Santa Clara Valley and Llagas Groundwater Basins shown in Figure 14 is the geologic limit of the effective recharge in both basins. Natural recharge from winter rainfall and runoff adds to the groundwater storage. In additions, the District artificially recharges reservoir water in streams and ponds operated throughout most of the year. The effective recharge occurs near streambeds which cross alluvial fan deposits in the southern portion of Santa Clara Valley and the northern portion of Llagas groundwater basins.

D. The cross section of the Santa Clara Valley Groundwater Basin in Figure 15 portrays the confined aquifer as several layers of impermeable clay which keep the water under pressure. When the groundwater is first tapped in the 1850's, the water flows under so much pressure that at least one well is declared a public nuisance.

E. Land subsidence, demonstrated in Figure 16, occurs in a confined aquifer system when clay layers compress due to an increase in seepage stress developed by a decrease in artesian pressure. From 1920 to 1965, a cumulative deficit in rainfall and a fourfold increase in pumping causes a decline in the artesian pressure. As shown in Figure 17, the dramatic change in surface elevation correlates to the change in groundwater pressure measured by the depth to water. After World War II, the population increases rapidly, and the water use changes from agriculture to municipal and industrial.

Land subsidence has virtually halts as of 1969 because the District provides treated water from water treatment plants in lieu of groundwater and restores artesian pressure by recharging the groundwater basin with both local and imported water.

F. Subsidence causes millions of dollars of damage; well casings collapse, flood control channels no longer protect surrounding areas, flood water needs to be pumped from low lying areas near the Bay because these areas are now below sea level, bridges over flood control channels need to be replaced to provide freeboard, and pumping may need to be added to sewage and storm water systems.

VII. SANTA CLARA VALLEY WATER DISTRICT FACILITIES (Figure 19)

A. The District operates a flexible conjunctive use system which is developed since the 1930's. In 1921, Tibbetts and Kieffer present a report to the Santa Clara Valley Water Conservation Committee. The plan details seventeen major reservoirs, low check dams on creeks, pumping stations in the lowlands to divert runoff, and concrete conduits to distribute water. The plan is too grandiose to be implemented, but it becomes the unofficial long range master plan.

B. In the 1920's, farmers start retarding stream flow by building low dams in natural creeks to both divert water into their fields and replenish the groundwater basin. In the 1930's, the first water conservation reservoirs are built to

conserve winter runoff to provide more water through the summer for surface water irrigation and recharge of the groundwater basins. The natural streams, shown in Figure 18, are the beginning of the District's water distribution system.

C. Land surface subsidence is first discovered in 1932 when the United States Coast and Geodetic Survey notes a four foot drop in elevation in San Jose since 1912. This adds to the concern for the groundwater basin and the need to recharge surface water.

D. Recharge ponds are built in the 1930's to increase the replenishment to the groundwater basin from the newly constructed reservoirs.

E. The 1950's and 1960's are the construction eras for state, federal, and local water projects. In the 1950's, additional reservoirs and raw water canals are added to the distribution system. Hetch Hetchy starts delivering water to northern Santa Clara County in 1954.

F. The State of California finishes designing the California Water Plan in 1957. In preparation for the arrival of State Water Project water in Santa Clara County in 1965, pipelines are built from the northeast part of the county to the central area to deliver raw water to percolation ponds and streams.

G. Rinconada and Penitencia Water Treatment Plants are added to the system in 1967 and 1974, respectively. These treatment plants relieve the demand for groundwater by

supplying treated water originating from the state water project.

H. In 1975, the District publishes a new master plan which describes the expansion of the in-county distribution system to meet the ultimate development of the county and specifically addresses the need to import water through the San Felipe Division of the federal Central Valley Project.

I. After major construction projects throughout the 1970's and 1980's, most of the facilities recommended in 1975 are now complete. New raw water pipelines and pump stations built by both the Bureau of Reclamation and the District bring federal Central Valley Project water starting in 1987 from San Luis Reservoir through the southeast corner to the center of the county. One new treatment plant starts producing potable water in 1988. Additional treated water pipelines deliver water from the new treatment plant, expand capacity and extend the treated water distribution system.

J. The District's facilities, shown in Figure 20, integrate local and imported water in the operation of ten water conservation reservoirs, three water treatment plants, 140 miles of pipelines, three pump stations, 350 acres of groundwater recharge ponds, and over 70 miles of recharge within creek channels. Both local and imported water can be treated at the three water treatment plants or recharged into the three groundwater basins.

K. Figure 21 depicts the conjunctive management of

water in Santa Clara County. Included in the sources in the left column of boxes are Hetch Hetchy water, state, federal, and local water managed by the District, and San Jose Water Company reservoir water. The middle column of boxes represents water treatment at water treatment plants or in groundwater basins. The final right column is water use, either municipal and industrial use or agricultural use. The District serves as the water wholesaler and delivers water to water retailers who then deliver either groundwater or treated water to the consumer.

VIII. PRICING POLICIES (Figure 23)

A. The District's Board of Directors adopts two major concepts in the 1971 pricing policy (Figure 24), the pooling concept and the water management concept.

B. The pooling concept simplifies water charges by stating that all water in a given zone of benefit is considered a single commodity with a uniform value regardless of source or cost. Costs associated with water imported through either the state or federal water systems is pooled with local water costs and expenditures necessary to treat, store, convey, and distribute water to determine the basic user rate in a specified zone. Rather than determine if a user is drinking San Felipe water, State Water Project water, artificially recharged water, or naturally recharged water, the costs associated with the necessary facilities are pooled

and assigned to the zone of benefit. Also, as stated in Figure 25, the pipelines and treatment plants augment the natural transmission and filtration of the groundwater basin and contribute to the common benefit.

C. The second concept, as stated in Figures 24 and 25, is the water management concept in which the user pays for benefits received. The basic user rate equals the groundwater charge; the total treated water cost equals the basic user rate plus the treated water surcharge. Generally, the treated water surcharge equals the average cost of pumping groundwater to preclude an unfair advantage to one user over another user. However, the treated water surcharge is manipulated to encourage optimization of an annual water supply. Although most water retailers use both treated water and groundwater, some are limited by pipeline capacities or groundwater quantity or quality.

D. Water pricing goals (Figure 26) are to provide capital to meet operating expenditures, finance capital improvements, fulfill bond covenants, maintain adequate contingencies, and prevent highly fluctuating water rates.

E. One unwritten rule is that revenue from water sales is at least two times the revenue from taxes. In 1964, the District starts collecting ad valorem taxes for the following purposes: countywide benefits from a dependable water supply, service area benefits from recreation and prevention of subsidence, and meeting contract obligations of the State

Water Project.

F. As shown in Figure 27, there are two zones of benefit. The northern area, Zone W-2, encompasses the Santa Clara Valley Groundwater Basin and is the highly urbanized area of the county which pays the groundwater charges since 1964. All three treatment plants and the majority of the reservoirs and imported water benefit this zone.

G. Zone W-5 is the southern area of the county in which agriculture uses fifty percent of the water. The District initiates the Zone W-5 groundwater charge in 1987 when San Felipe water arrives in the county.

H. After treated water contractors fulfill their obligations to buy a contracted quantity of treated water, the cheaper non-contract water is available in the winter to encourage a steady flow through the water treatment plants.

I. By District Act, the agricultural water can be no more than one fourth of the municipal and industrial water rate within each zone.

J. In 1984, Santa Clara County voters authorize the District to issue revenue bonds when approved by the District's Board of Directors instead of requiring the approval of the electorate. Because of revenue bond covenants, both revenue bonds and pay as you go funds are used to finance capital improvements. Obviously, the capital improvements costs and schedules affect the water pricing recommendations and financing alternatives.

IX. ADVISORY GROUPS

The District traditionally presents the financial picture, water rates, construction schedule, and financing to three advisory groups. The Water Retail Agencies is composed of staff members from every water retail agency within the county. The Agricultural Water Advisory Committee has representatives from the agricultural community. Representatives selected from the local city councils and county supervisors advise the District through the Santa Clara Valley Water Commission. All three advisory groups are created by the District to provide information to the public and solicit public involvement. The District's Board of Directors adopts water rates in May for the following fiscal year after holding public hearings in both north and south county and soliciting the recommendations of the advisory committees.

X. DROUGHT MANAGEMENT (FIGURE 32)

A. The District tries a variety of water management alternatives as conditions change during five years of drought from 1987 through 1991. First, very low runoff in the District's reservoirs, then low runoff and rapidly decreasing pressures in the Santa Clara Valley groundwater confined zone, and finally greatly reduced quantities of imported water create uncertain conditions each year.

B. Figure 33 graphs the calculated cumulative storage

in the Santa Clara Valley groundwater basin and the pressure as indicated by the depth to water at an index well in the same basin. The general trend of the index well correlates with the groundwater basin storage. Figure 34 lists the District's drought management alternatives.

C. The groundwater basin protects the District through one year of drought in 1988. However, water demand is increasing, and San Felipe water is not available until the middle of the year. Also, the groundwater basin is overdrafted before the five years of drought begin. In 1988, the District requests a voluntary 15% water use reduction while Hetch Hetchy institutes a mandatory 25% reduction. San Felipe water is flowing to two water treatment plants, one of which is completed in 1988, to meet the increased treated water demand.

D. In 1989, the District, concerned about the potential recurrence of subsidence, requests a mandatory 25% water use reduction program while Hetch Hetchy has no restrictions. The District reduces the treated water surcharge to encourage the use of treated water and appeals to the water retailers to minimize the groundwater basin. The water retailers reduce their pumping by fifty percent in the northern area of the county.

E. The District purchases the first transfer water from Yuba County and transports this water through state facilities during the next three years. Through the cooperation of the

cities, local ordinances are passed to prevent water waste. The water retailers use a variety of methods to encourage water use reductions, penalize those who use more than allocated, and encourage nonpotable water and reclaimed wastewater for irrigation and construction. At the same time, the City of San Jose is employing a variety of water conservation programs to reduce sewage treatment outflows to San Francisco Bay.

F. Through state legislation, the District Act is amended to allow an overproduction charge for pumping more water than was pumped in a base period from the groundwater basin. This is approved too late in the year to apply a penalty for increased groundwater pumping in 1989.

G. By 1990, the pressures in the groundwater recover because the water retailers maximized treated water and minimized groundwater during the summer of 1989. However, the Bureau of Reclamation announces a 50% reduction in water deliveries on the Central Valley Project. The District institute a 20% water use reduction in the northern area and a 25% reduction in the southern area of the county; Hetch Hetchy establishes a 25% reduction.

H. 1991 looms as the worst possible statewide drought until rain and snow in March relieve some of the water worries. The March rains bring the local reservoirs from 10% of capacity to 38% of capacity. This year, both the District and Hetch Hetchy maintain a 25% reduction program. The Bureau

provides only 25% of the District's entitlement plus some hardship water. The State Water Project provides only 20% of the District's contracted entitlement. Even though the last of the Yuba County water flows through the treatment plants in early 1991, the District negotiates more water transfers to replace the substantial loss of imported water. Placer County water and state water pool water are added to the total imported water.

I. For the first time, the State of California's Department of Water Resources buys water from agricultural users to create a pool of water to serve the most severe droughts throughout the state. Both the District and Hetch Hetchy are recipients of this water.

J. The water transfer door is open. Some communities are willing to sell available water until the demand in that community equals the supply. Some farmers are willing to sell water in critical years to assist drought stricken areas without giving up water rights and the farming occupation. However, the full impact may not yet be realized to the farming community until the loss of markets and unemployment associated with those crops is evaluated.

K. During the water transfer negotiations, facilities become an issue. Some areas of the state are not physically connected to either of the state or federal water projects. While the state is able to charge for transportation of water that is not State Water Project water, the Bureau is able to

transport only Bureau water through the Central Valley Project until Congress changes federal law.

L. Needless to say, the drought negatively impacts the District with reduced water supply, reduced water quality from the Delta, reduced water quality from San Luis Reservoir in the Central Valley Project, higher trihalomethanes in the treatment plants, reduced water sales, and increased costs to purchase water. This year, the recession and high water rates bring the District's budget under scrutiny. The District's Board of Directors approved the water rates based on an increase in expenditures to buy transfer water, a potential increase in the cost of Bureau water, a drastic decrease in District program expenditures, and maintaining fiscal year 1990-91 agricultural water rates to keep open space in the southern area of the county.

XI. 1992 MASTER PLAN (Figure 35)

A. Three major issues form the basis for a water management plan: supply, quality, and security.

B. The past five years of drought emphasize the District's susceptibility to drought and growing dependence on imported water. Reductions in local and imported supply and the threat of subsidence restricting the available groundwater need to be reviewed. As shown in Figure 36, the final plan may include recommendations on reclaimed water, more efficient use of water, water transfers, construction of additional

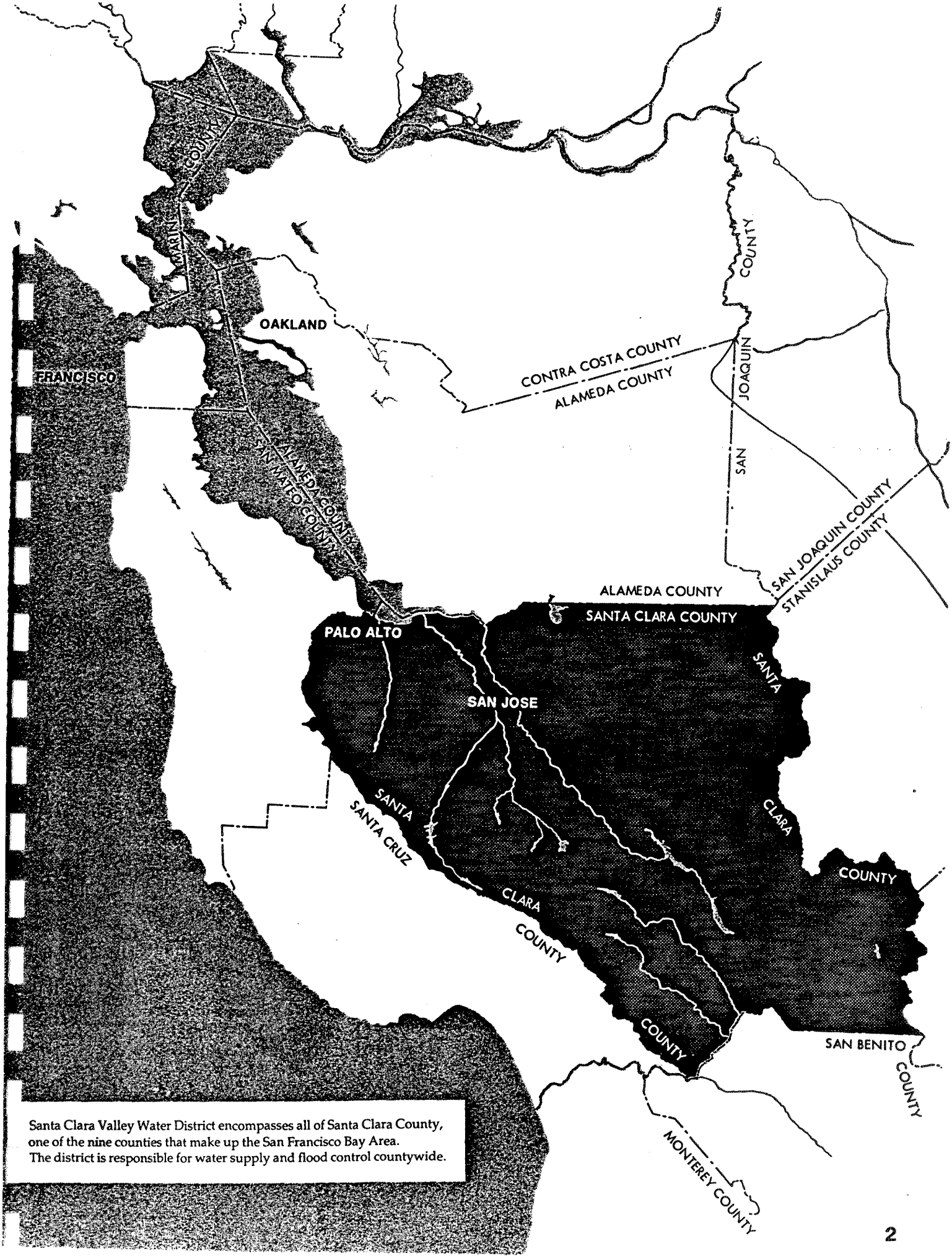
facilities, drought contingency planning, and groundwater basin management program.

C. Increased state and federal regulations along with uncertainty about disinfection by-products and the threat of groundwater contamination contribute to a need for a revised and comprehensive operational plan. As listed in Figure 37, water treatment plant improvements, disinfection by-products action plan, wellhead protection, watershed management, and non-point source control plans are being addressed.

D. Disruptions in service from earthquakes or contamination also affect the reliability of the District's water supply and quality. The 1989 Loma Prieta earthquake demonstrates the need for reliable services during emergencies. In tabulated in Figure 38, redundancies in the system, adequate storage, and disaster preparedness planning may decrease the District's vulnerability.

SURFACE WATER AND GROUNDWATER CONJUNCTIVE USE MANAGEMENT

SANTA CLARA VALLEY WATER DISTRICT
SANTA CLARA COUNTY, CALIFORNIA



Santa Clara Valley Water District encompasses all of Santa Clara County, one of the nine counties that make up the San Francisco Bay Area. The district is responsible for water supply and flood control countywide.

SANTA CLARA COUNTY

- 1.5 million people
- 1330 square miles
- 14 inches average rainfall
- Total water use in 1987: 400,000 acre-feet
- 3 imported sources of supply
  State Water Project
  - South Bay Aqueduct
  Central Valley Project
  - San Felipe Division
  City & County of San Francisco
  - Hetch Hetchy Aqueduct

SANTA CLARA COUNTY WATER USE IN 1987

- 400,000 acre-feet total water use
- 216,000 acre-feet District groundwater
- 102,000 acre-feet District treated water
- 77,000 acre-feet Hetch Hetchy water
- 5,000 acre-feet District surface water

SANTA CLARA COUNTY WATER USE

RESIDENTIAL	47%
COMMERCIAL	30%
INDUSTRIAL	15%
AGRICULTURAL	8%

SANTA CLARA VALLEY WATER DISTRICT

Special district

Created by State of California legislation

Boundary contiguous with county boundary

Responsible for water supply and flood control

Governed by 7 member board

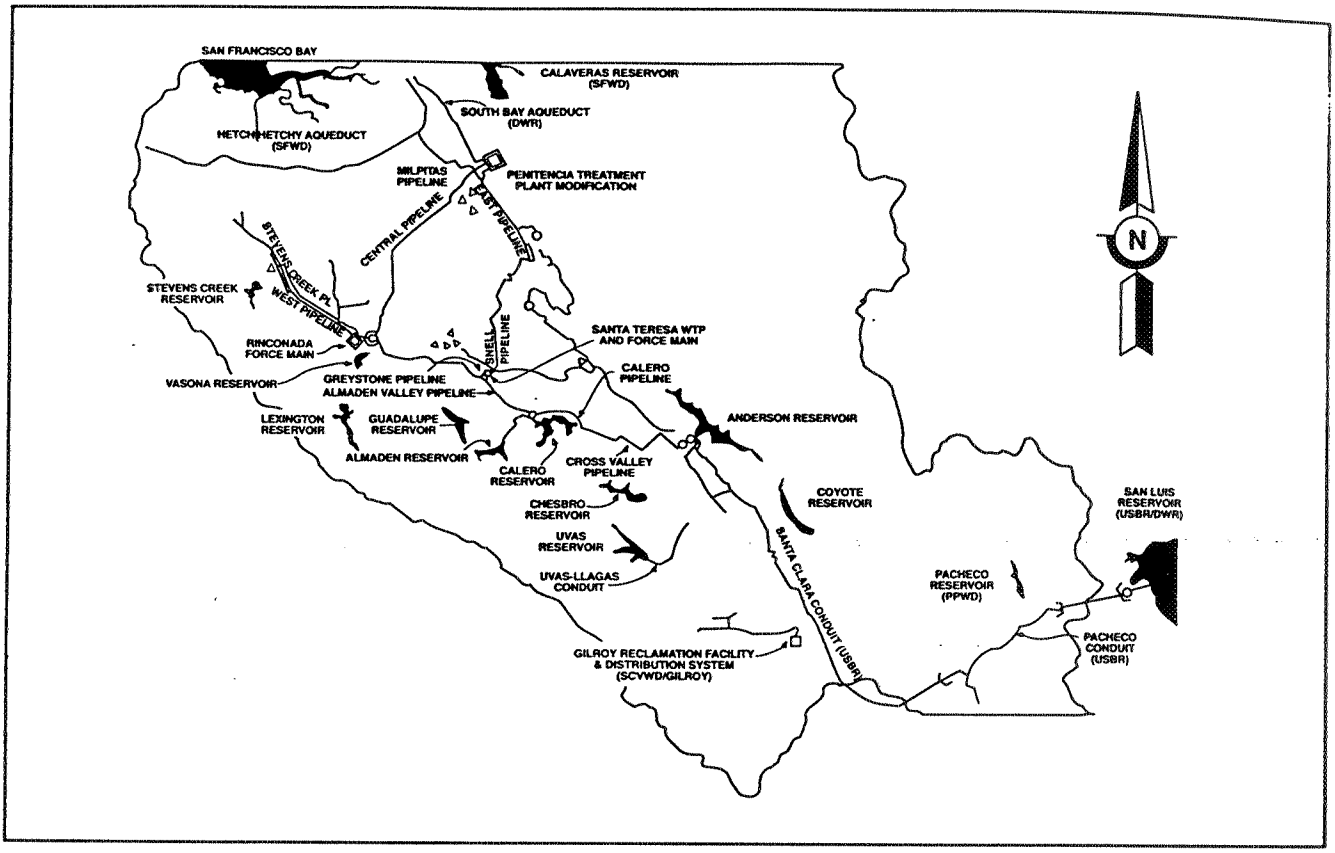
- 5 elected members
- 2 appointed members

Water wholesaler

CONJUNCTIVE USE

JOINT USE OF SURFACE WATER
AND GROUNDWATER

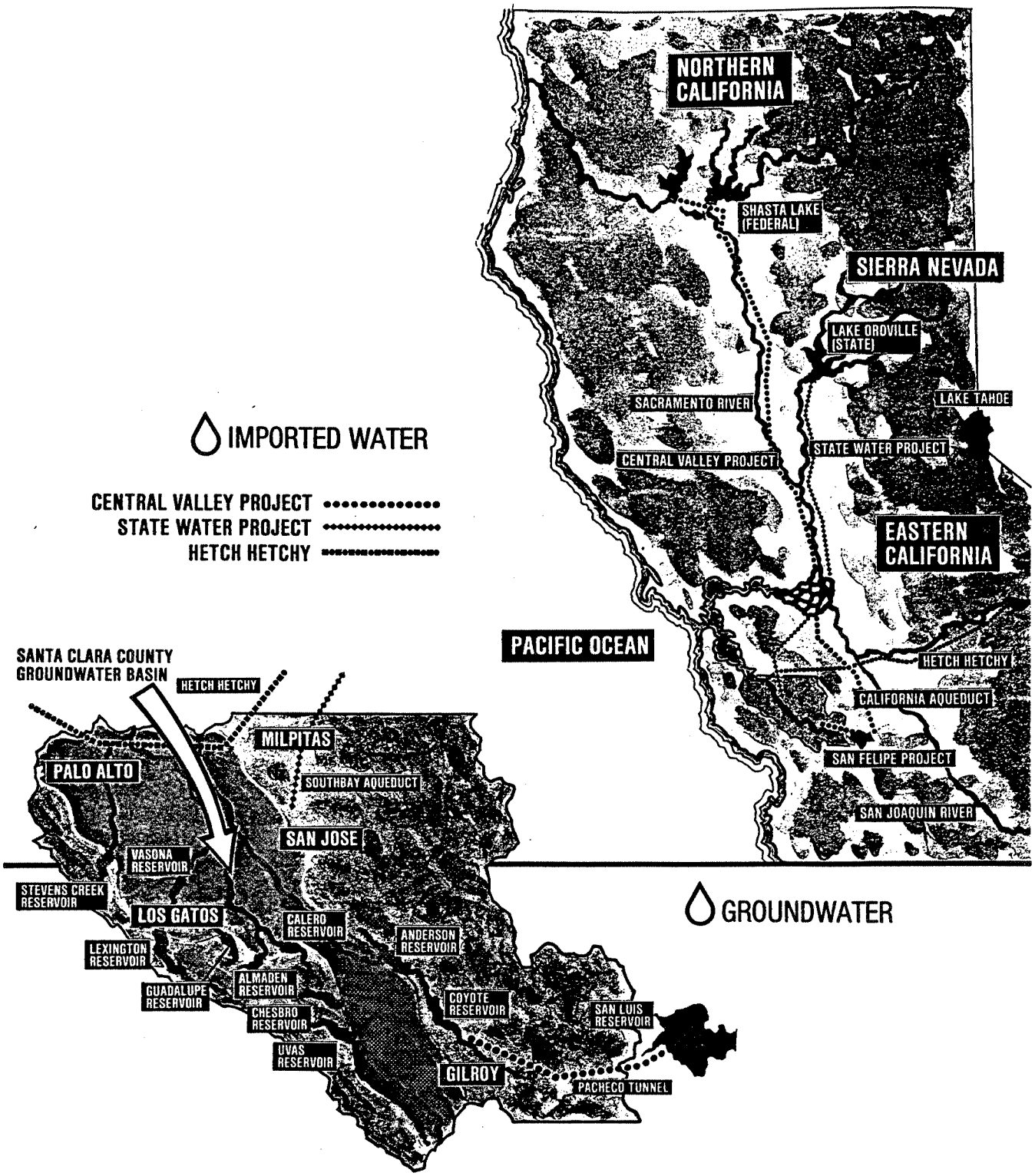
TO PROVIDE
A FLEXIBLE AND RELIABLE
DISTRIBUTION SYSTEM



Santa Clara Valley Water District Conveyance, Treatment and Distribution System.

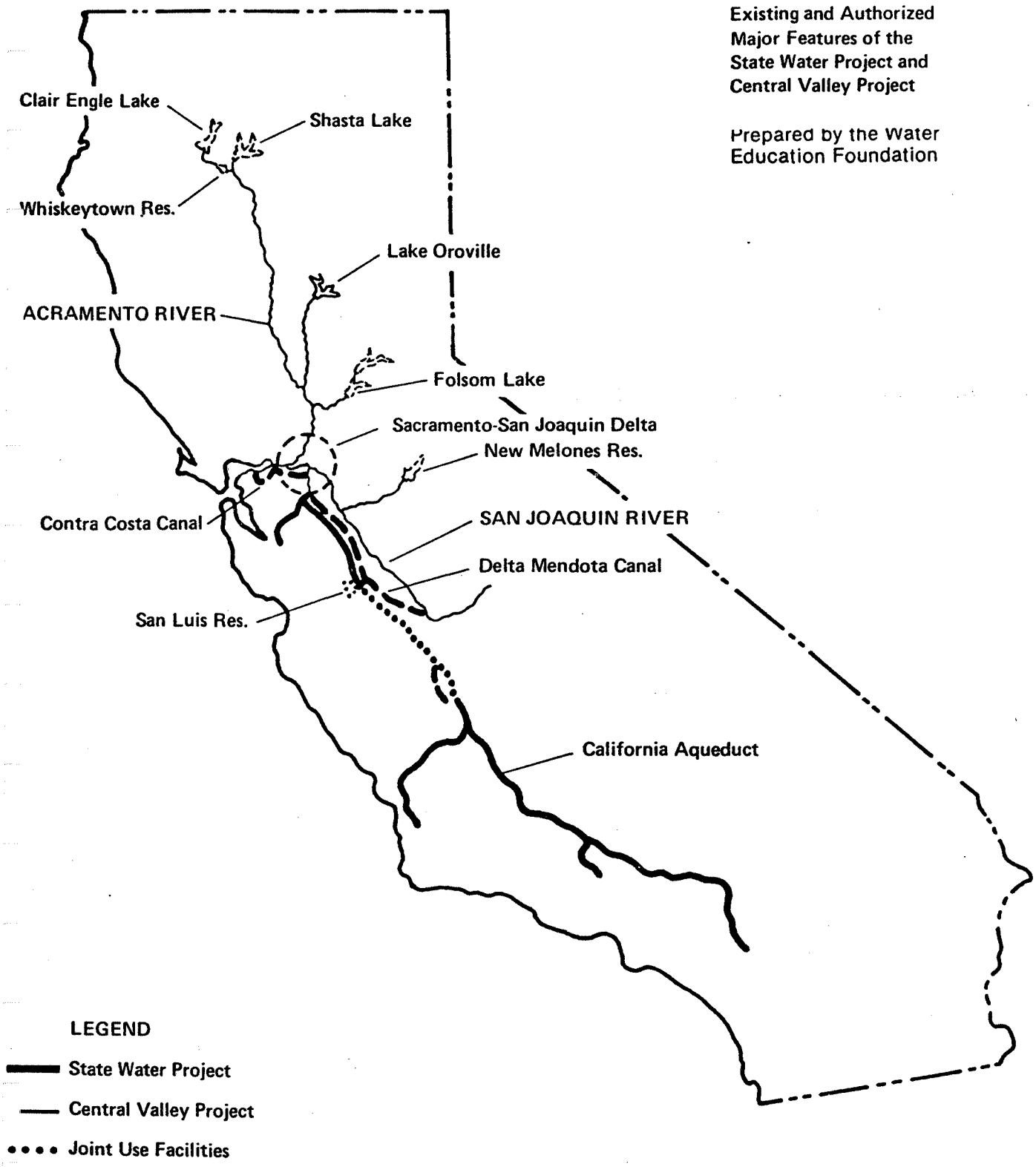
Santa Clara Valley Water District's conjunctive use program has helped the area immeasurably over these past few dry years. Shown here, spreading grounds used by the district.

IMPORTED WATER SOURCES



OUR WATER SOURCES

Santa Clara Valley Water District

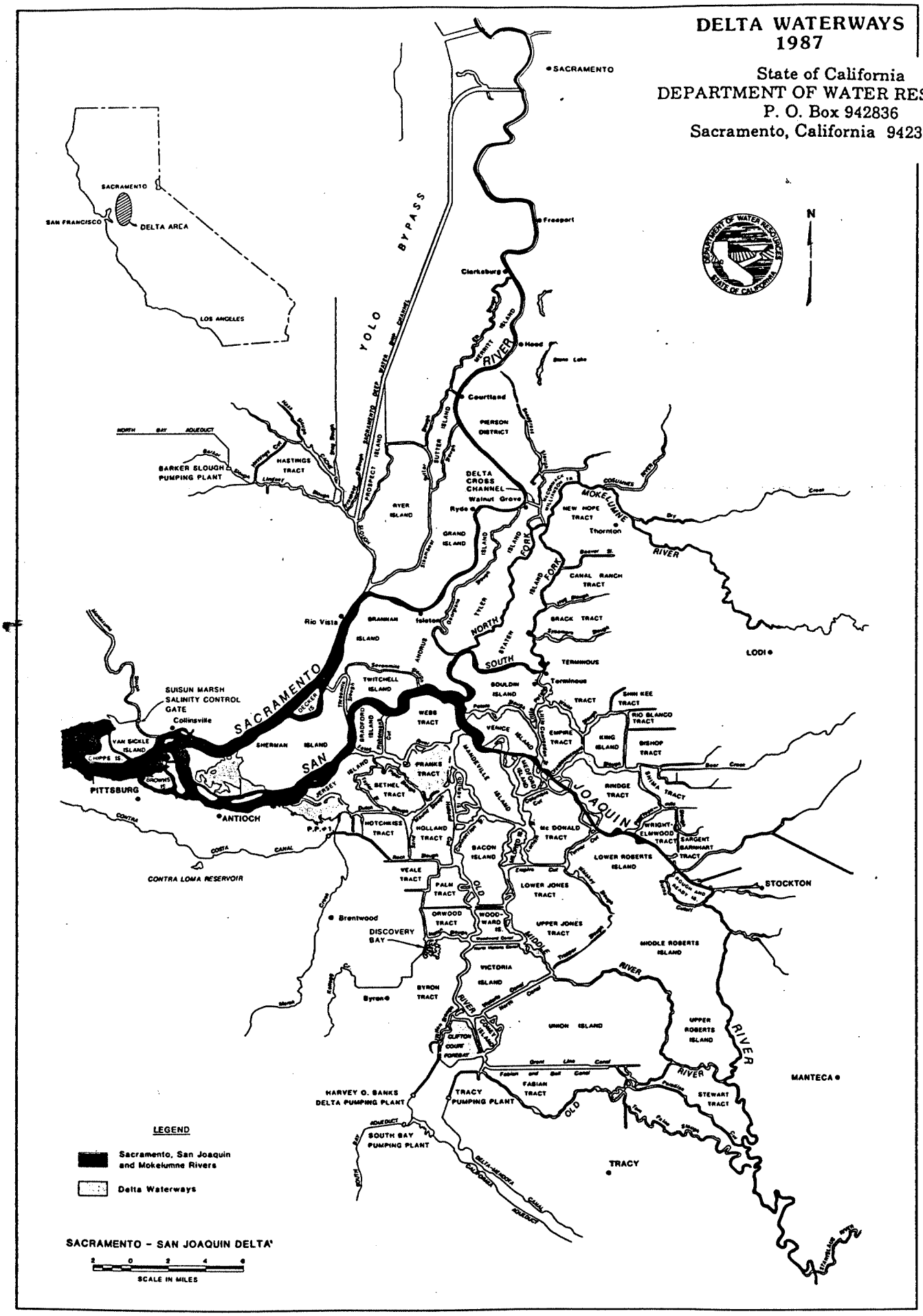


Existing and Authorized Major Features of the State Water Project and Central Valley Project

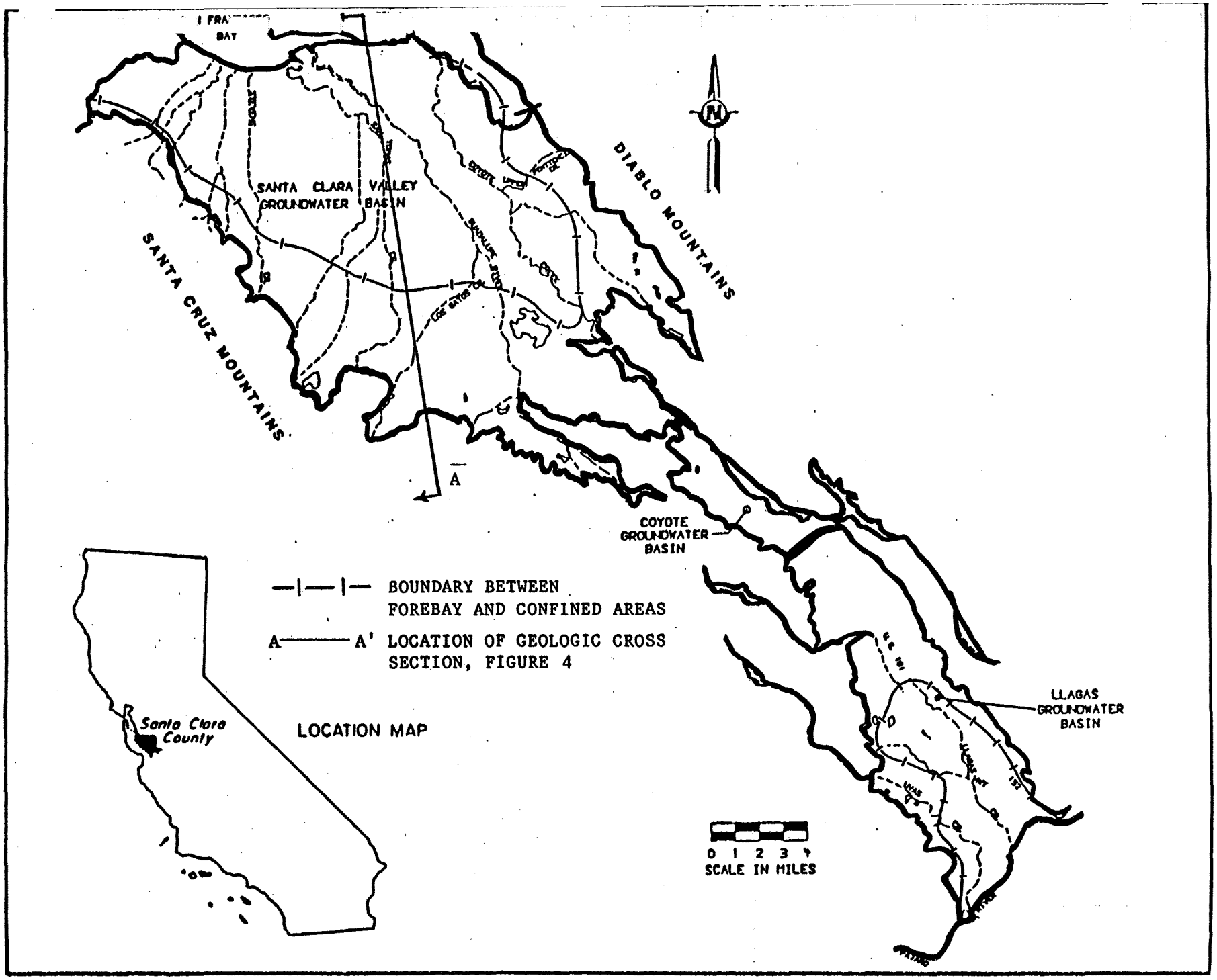
Prepared by the Water Education Foundation

DELTA WATERWAYS
1987

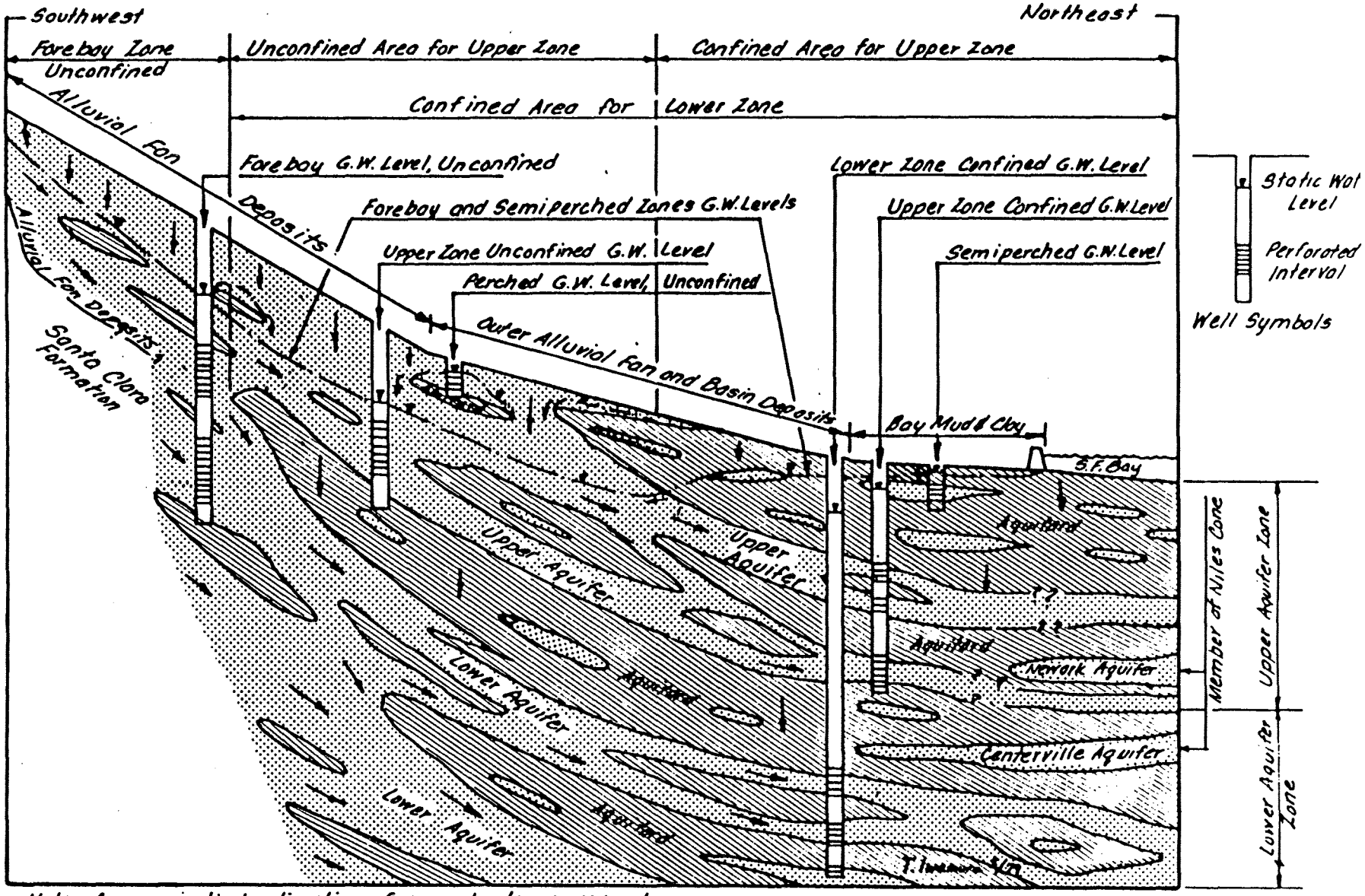
State of California
DEPARTMENT OF WATER RESOURCES
P. O. Box 942836
Sacramento, California 94236-0001



GROUNDWATER RECHARGE PROGRAM

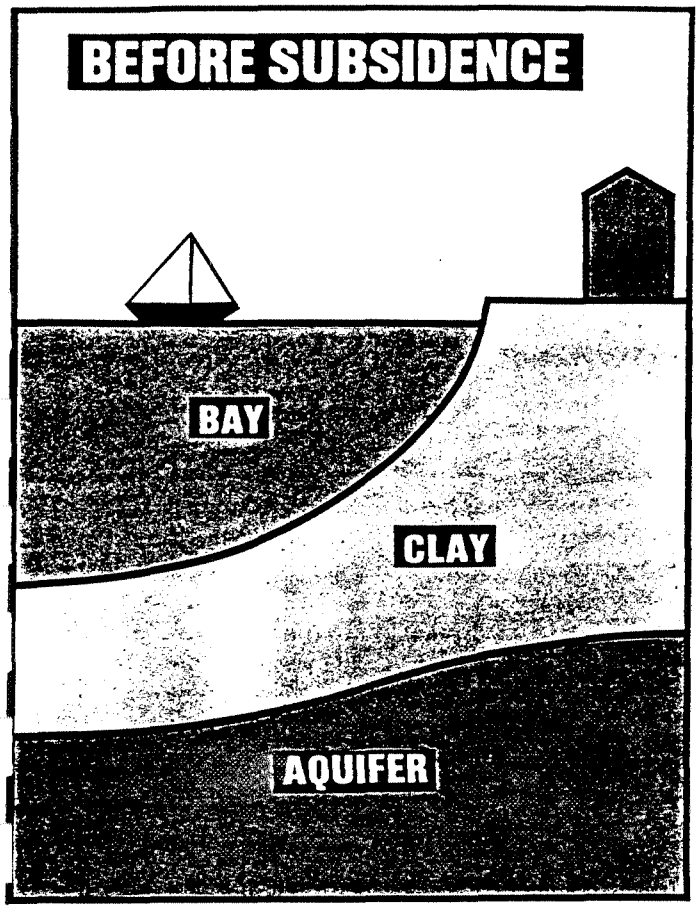


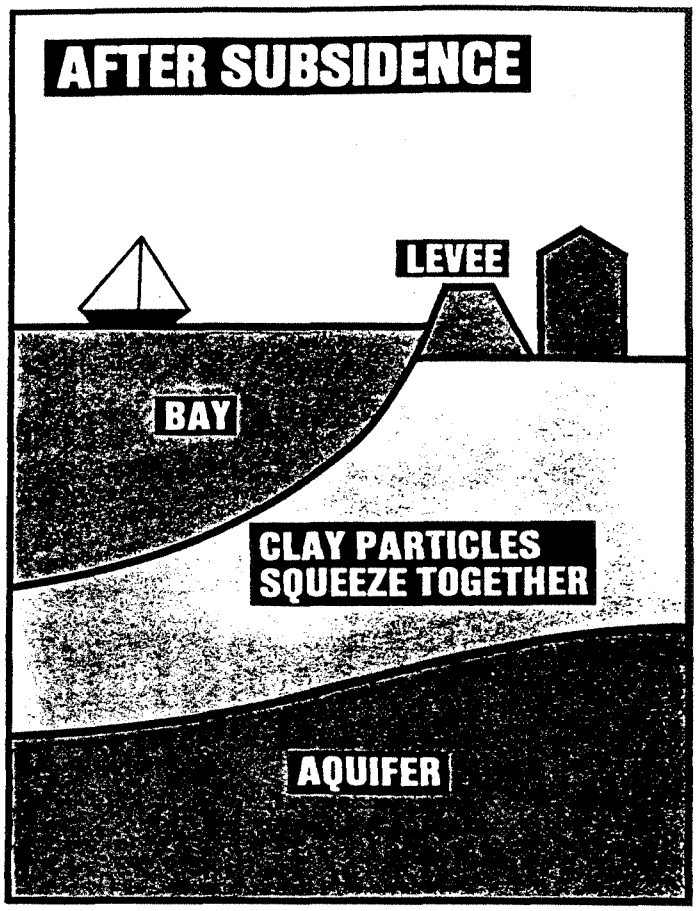
Santa Clara County Groundwater Basins



Note: Arrows indicate direction of groundwater movement without regard to quantity.

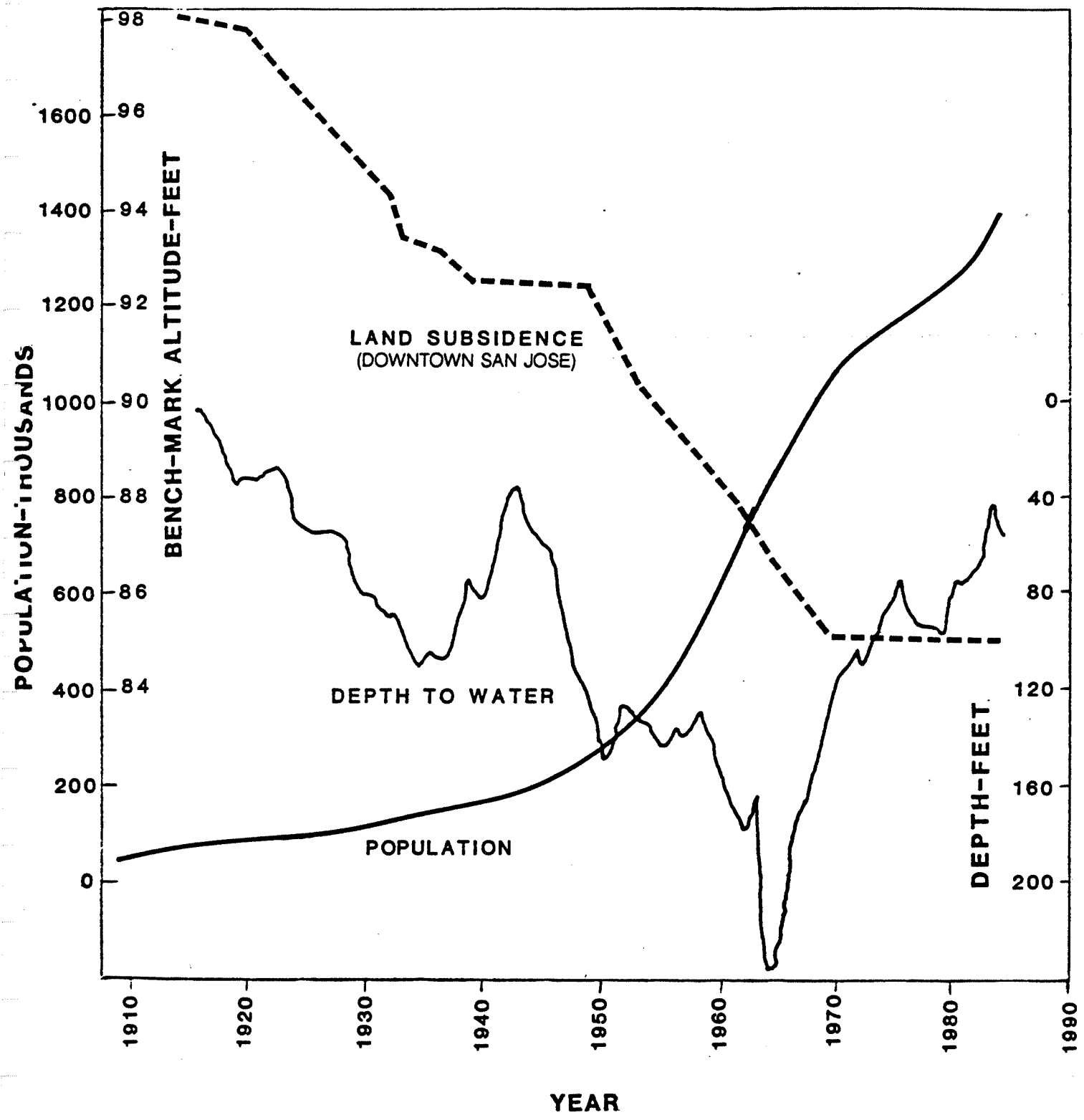
DIAGRAMMATIC GEOLOGIC PROFILE DEPICTING MODES OF OCCURRENCE OF GROUNDWATER, PALO ALTO-MOUNTAIN VIEW AREA





LAND SURFACE SUBSIDENCE

Santa Clara Valley Water District


POPULATION-THOUSANDS
BENCH-MARK ALTITUDE-FEET
DEPTH-FEET
YEAR
LAND SUBSIDENCE
(DOWNTOWN SAN JOSE)
DEPTH TO WATER
POPULATION
1600
1400
1200
1000
800
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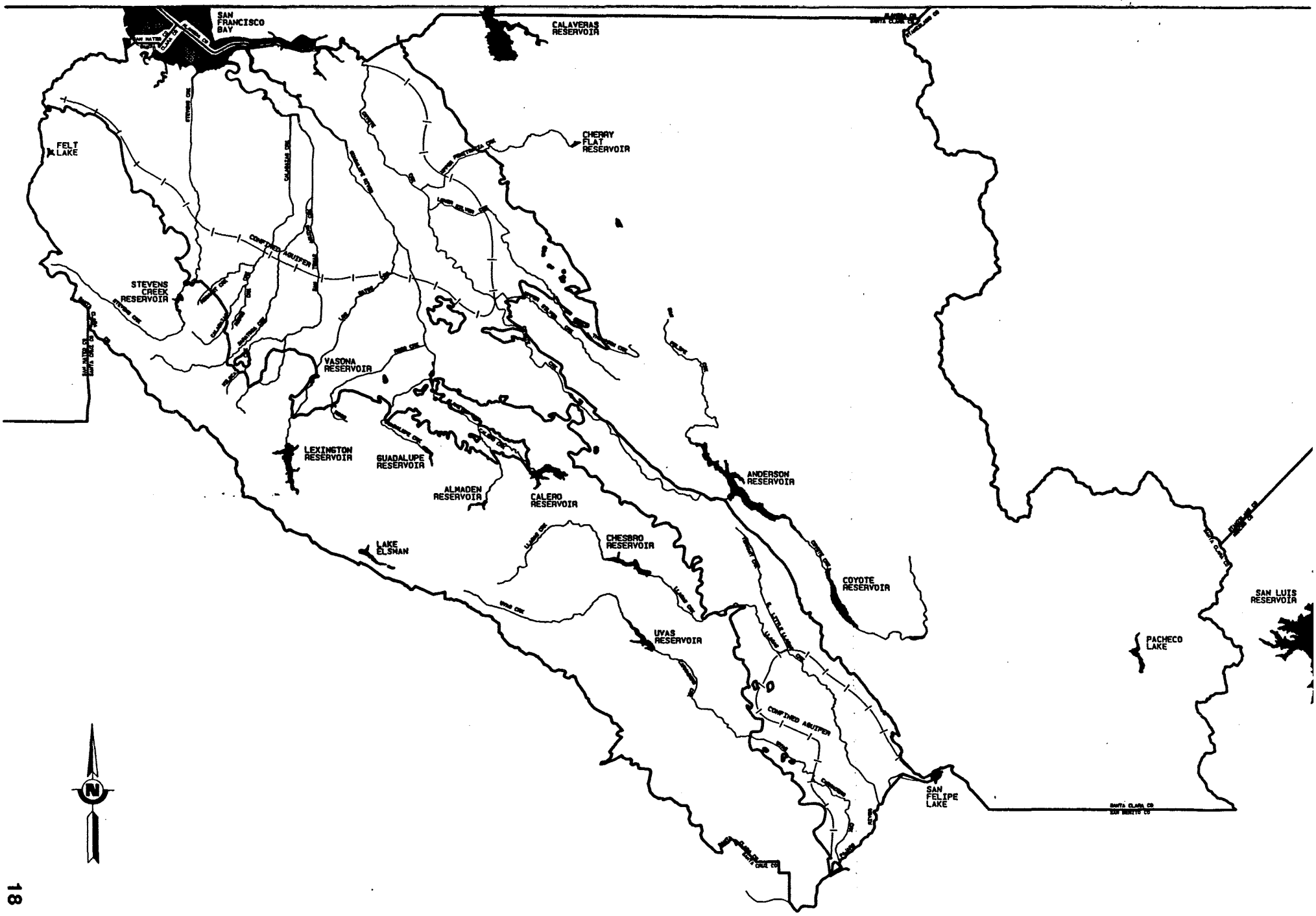
SAN FRANCISCO BAY
CALAVERAS RESERVOIR
CHERRY FLAT RESERVOIR
FELT LAKE
STEVENS CREEK RESERVOIR
VASONA RESERVOIR
LEXINGTON RESERVOIR
GUADALUPE RESERVOIR
ALMADEN RESERVOIR
CALERO RESERVOIR
LAKE ELSMAN
CHESBRO RESERVOIR
UVAS RESERVOIR
ANDERSON RESERVOIR
COYOTE RESERVOIR
SAN LUIS RESERVOIR
PACHECO LAKE
SAN FELIPE LAKE
CONFINED AQUIFER
CONFINED AQUIFER
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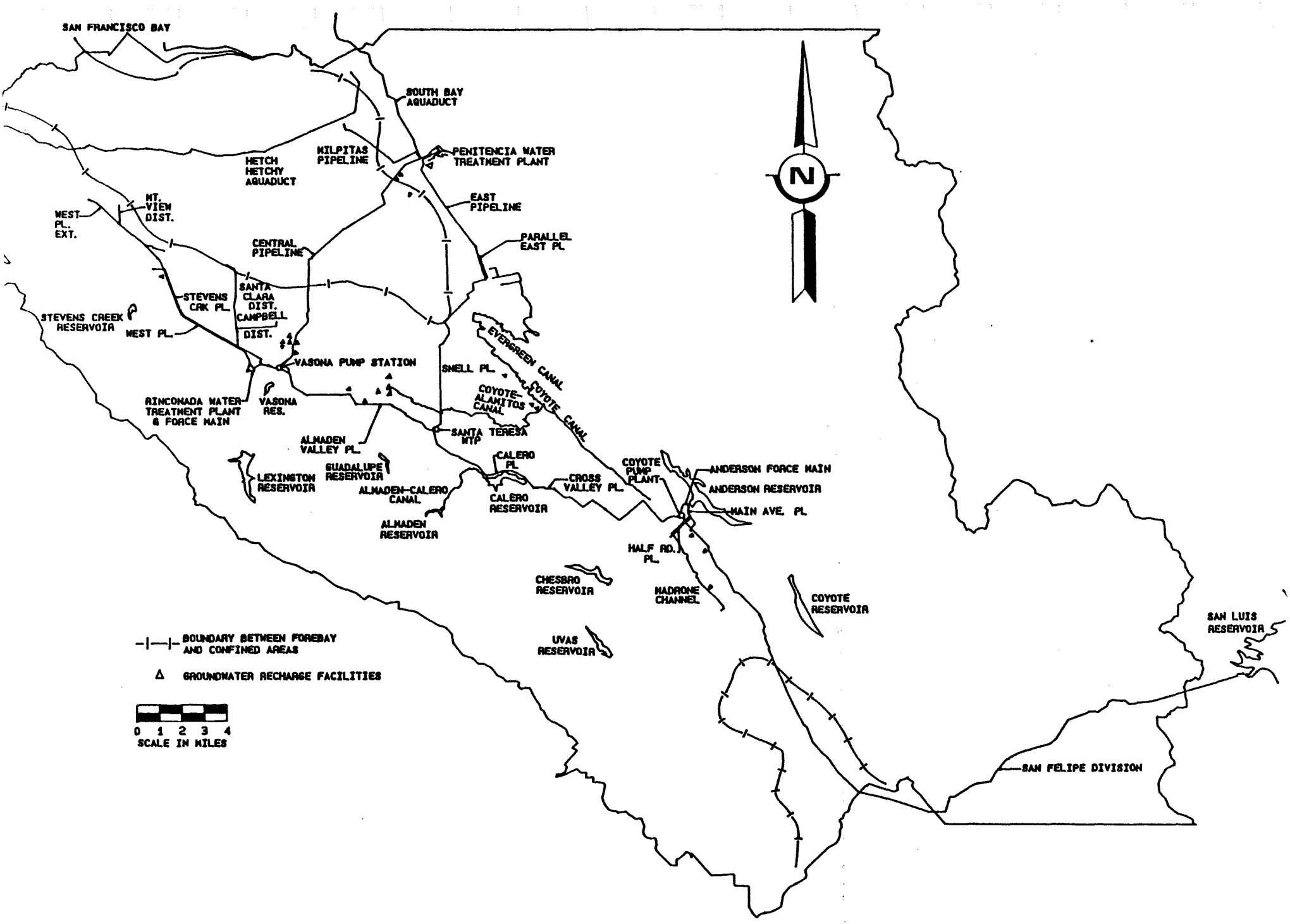
IN-COUNTY WATER DISTRIBUTION SYSTEM

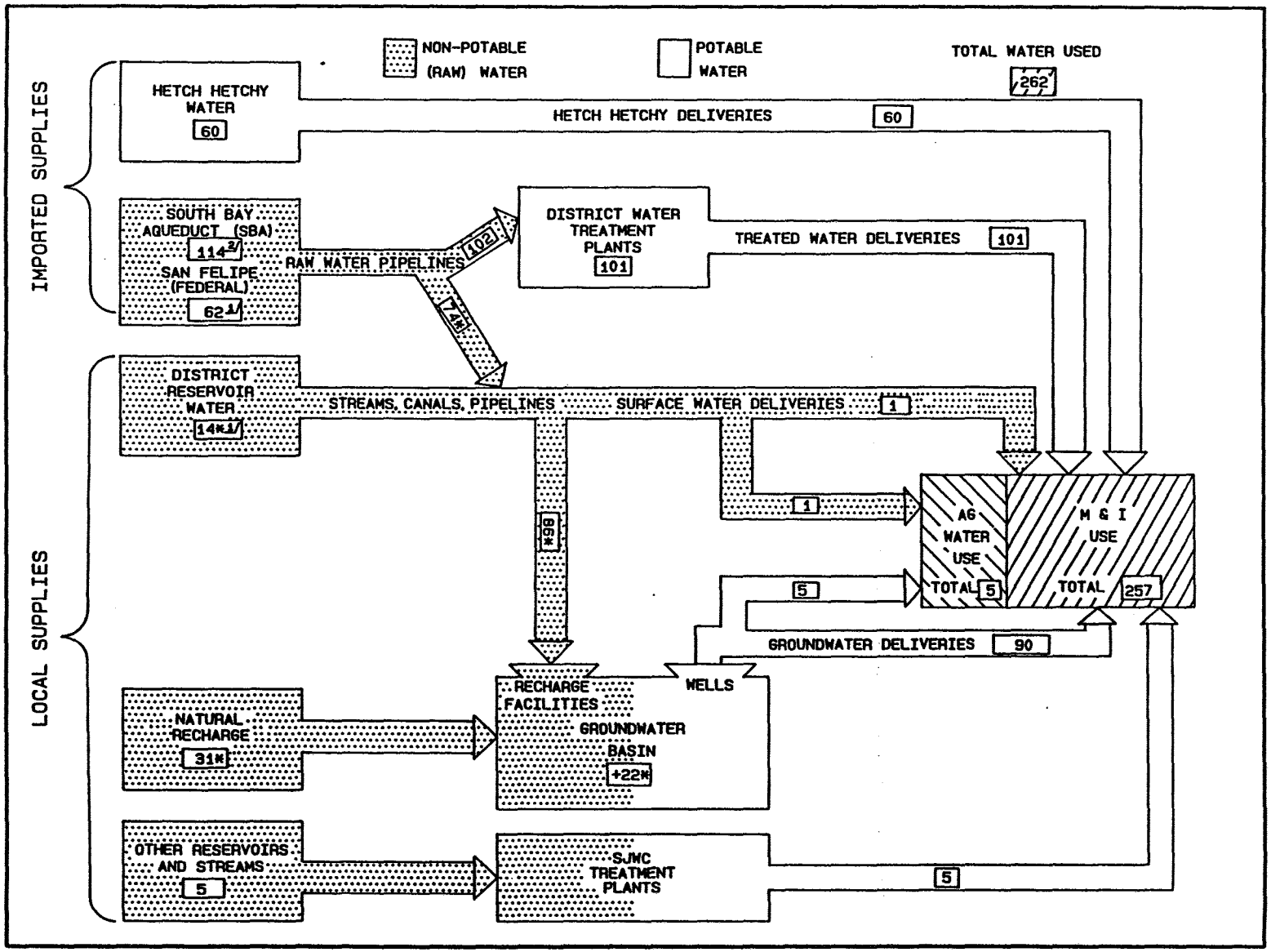

SAN FRANCISCO BAY
SOUTH BAY AQUADUCT
MILPITAS PIPELINE
PENITENCIA WATER TREATMENT PLANT
HETCH HETCHY AQUADUCT
EAST PIPELINE
MT. VIEW DIST.
WEST PL. EXT.
PARALLEL EAST PL
CENTRAL PIPELINE
SANTA CLARA DIST.
STEVENS CRK PL.
CAMPBELL DIST.
STEVENS CREEK RESERVOIR
WEST PL.
EVERGREEN CANAL
COYOTE CANAL
VASONA PUMP STATION
SNELL PL.
COYOTE-ALAMITOS CANAL
RINCONADA WATER TREATMENT PLANT & FORCE MAIN
VASONA RES.
SANTA TERESA WTP
ALMADEN VALLEY PL.
CALERO PL.
GUADALUPE RESERVOIR
COYOTE PUMP PLANT
ANDERSON FORCE MAIN
LEXINGTON RESERVOIR
CROSS VALLEY PL.
ANDERSON RESERVOIR
ALMADEN-CALERO CANAL
CALERO RESERVOIR
MAIN AVE. PL.
ALMADEN RESERVOIR
HALF RD. PL.
CHESBRO RESERVOIR
MADRONE CHANNEL
COYOTE RESERVOIR
SAN LUIS RESERVOIR
UVAS RESERVOIR
BOUNDARY BETWEEN FOREBAY AND CONFINED AREAS
GROUNDWATER RECHARGE FACILITIES
0 1 2 3 4
SCALE IN MILES
SAN FELIPE DIVISION
N

NC..... SAN... CLAR.. COUN..

(ZONE W-2)

1989-90

(VALUES IN THOUSAND ACRE-FEET)

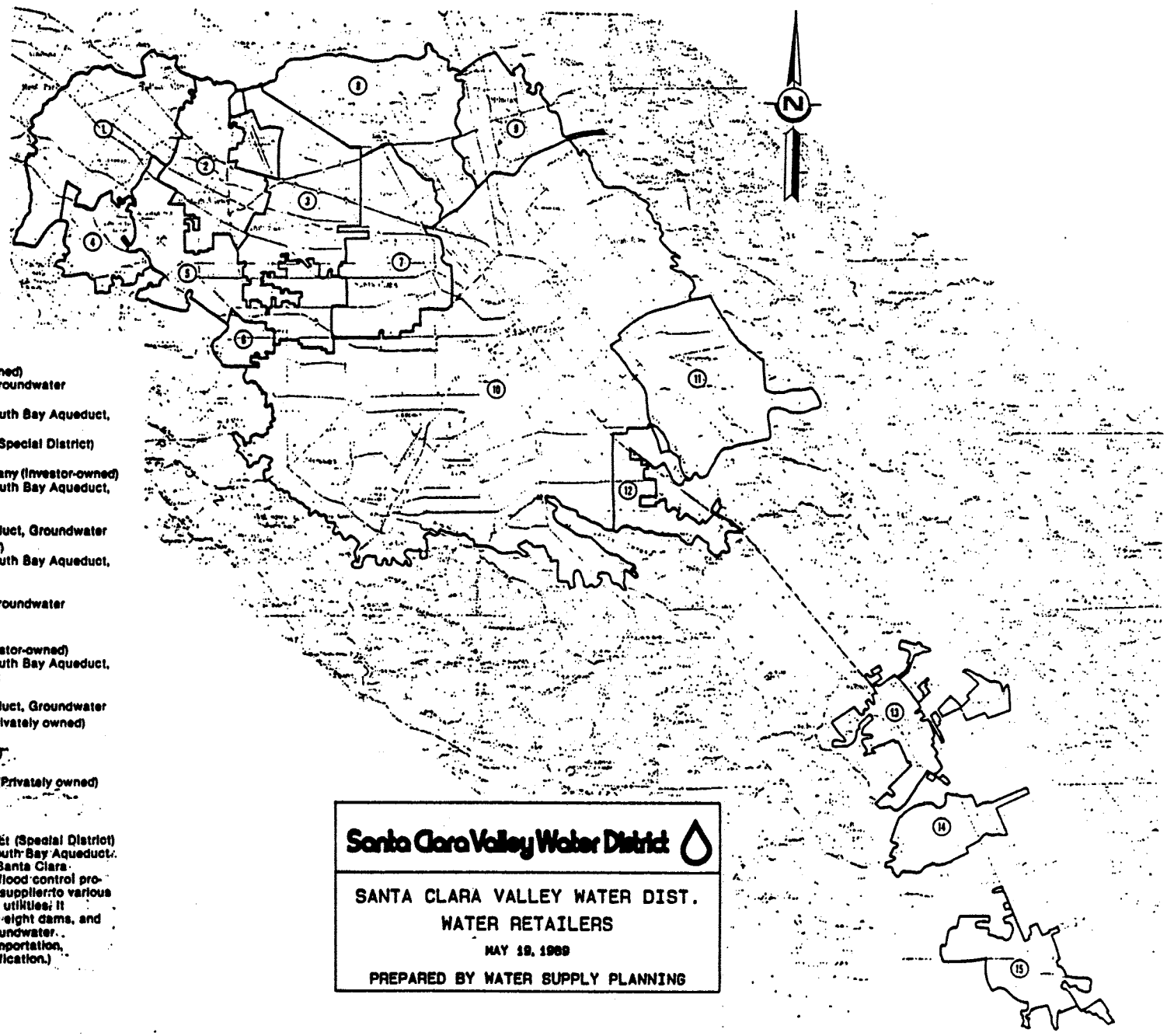


INFORMATION NECESSARY TO FINALIZE THIS DIAGRAM WAS NOT AVAILABLE AT THE TIME THIS REPORT WAS PREPARED

1/ INCLUDES 3,000 AF OF SAN FELIPE WATER OUT OF RESERVOIR STORAGE

2/ INCLUDES WATER PURCHASED FROM YUBA COUNTY

* PRELIMINARY - SUBJECT TO REVISION



1. City of Palo Alto (City-owned)
   Water supply: Hetch-Hetchy
2. City of Mountain View (City-owned)
   Water supply: Hetch-Hetchy, Groundwater
3. City of Sunnyvale (City-owned)
   Water supply: Groundwater, South Bay Aqueduct, Hetch-Hetchy
4. Purissima Hills Water District (Special District)
   Water supply: Hetch-Hetchy
5. California Water Service Company (Investor-owned)
   Water supply: Groundwater, South Bay Aqueduct, Hetch-Hetchy
6. City of Cupertino (City-owned)
   Water supply: South Bay Aqueduct, Groundwater
7. City of Santa Clara (City-owned)
   Water supply: Groundwater, South Bay Aqueduct, Hetch-Hetchy
8. City of San Jose (City-owned)
   Water supply: Hetch-Hetchy, Groundwater
9. City of Milpitas (City-owned)
   Water supply: Hetch-Hetchy
10. San Jose Water Company (Investor-owned)
    Water supply: Groundwater, South Bay Aqueduct, SJWC-operated treatment plant
11. City of San Jose (City-owned)
    Water supply: South Bay Aqueduct, Groundwater
12. Great Oaks Water Company (Privately owned)
    Water supply: Groundwater
13. City of Morgan Hill (City-owned)
    Water supply: Groundwater
14. West San Martin Water Works (Privately owned)
    Water supply: Groundwater
15. City of Gilroy (City-owned)
    Water supply: Groundwater
16. Santa Clara Valley Water District (Special District)
    Water supply: Groundwater, South Bay Aqueduct.
    (The District serves the entire Santa Clara County with water supply and flood control programs. It is a wholesale water supplier to various city-owned and investor-owned utilities. It operates two treatment plants, eight dams, and also conducts programs in groundwater recharge, water reclamation, importation, distribution, and weather modification.)

WATER PRICING

PRICING POLICIES

POOLING CONCEPT

All water in a given zone of benefit is considered a single commodity with a uniform value regardless of source or cost.

WATER MANAGEMENT POLICY

The user pays for benefits received.

1971 PRICING POLICY
OBJECTIVES

- WATER FACILITIES COST POOLING CONCEPT
- • Pipelines and treatment plants augment natural transmission and filtration of groundwater basin
- • Charges based on common benefit

- WATER RESOURCES MANAGEMENT CONCEPT
- • Through taxing and pricing, establish competitive rates and optimize the benefits received

PRICING GOALS

PROVIDE CAPITAL FOR:

OPERATING EXPENDITURES

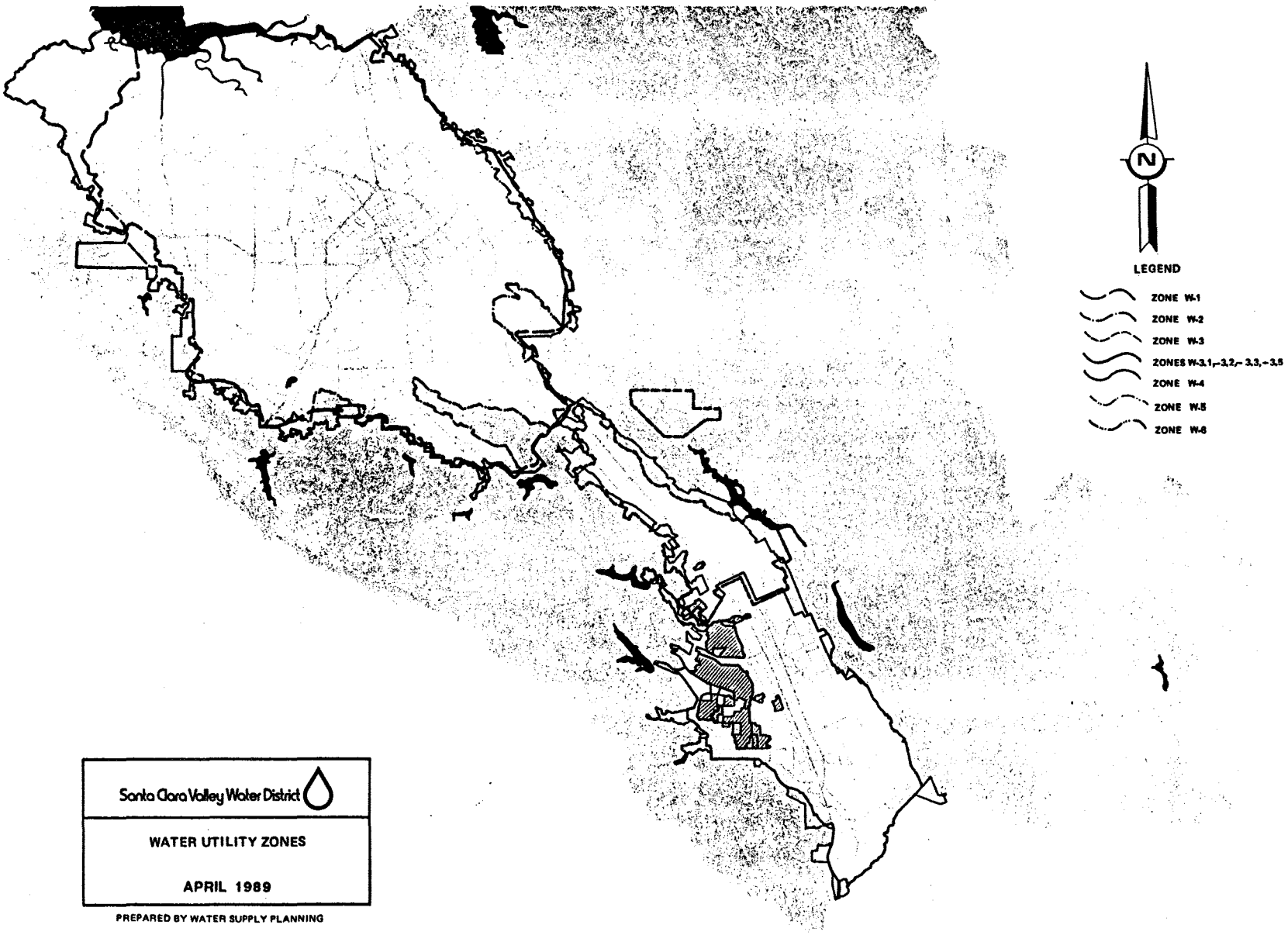
CAPITAL IMPROVEMENTS

BOND COVENANTS

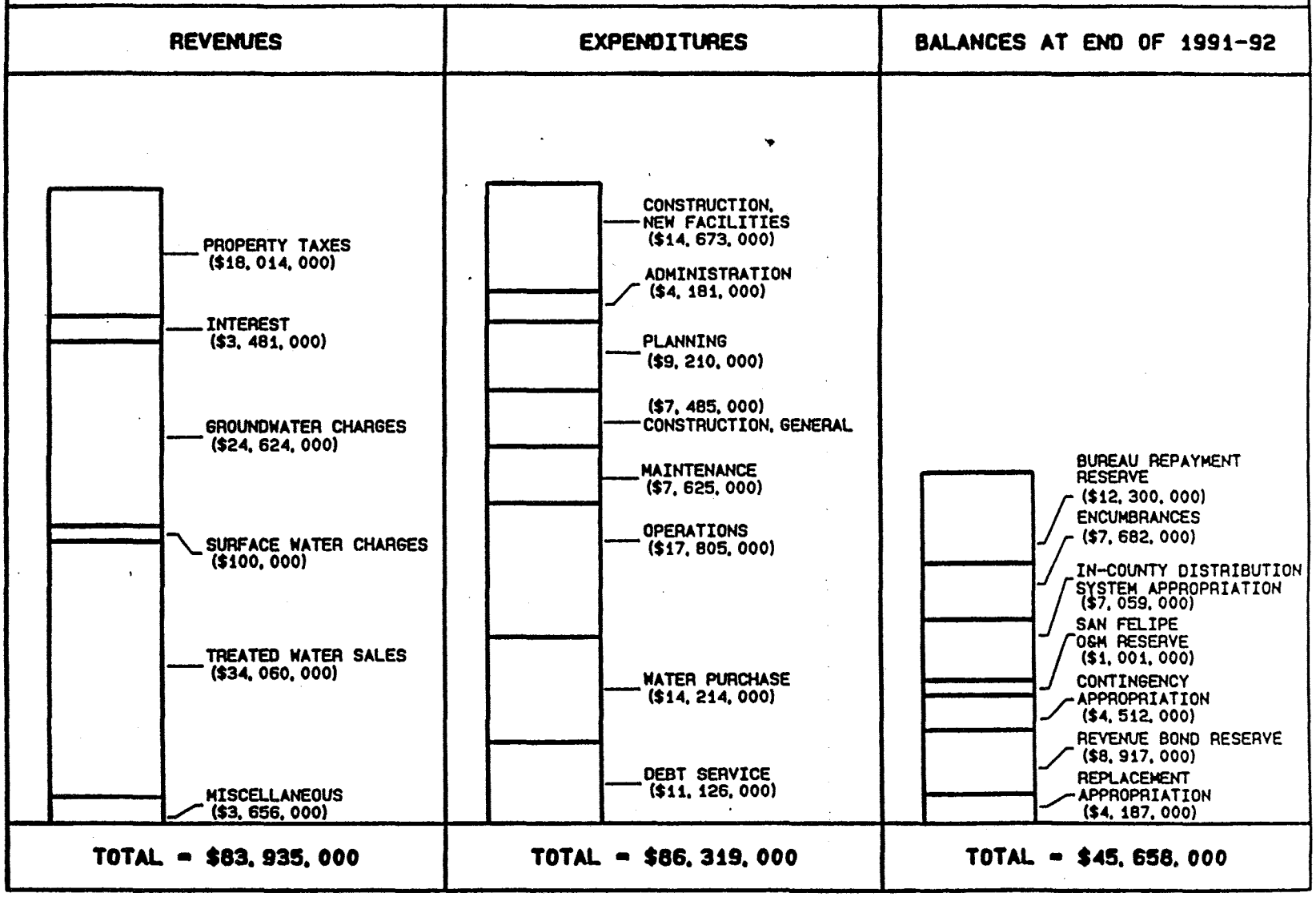
CONTINGENCIES

PREVENT HIGHLY FLUCTUATING WATER RATES

. . . Related to Costs of Providing Benefits

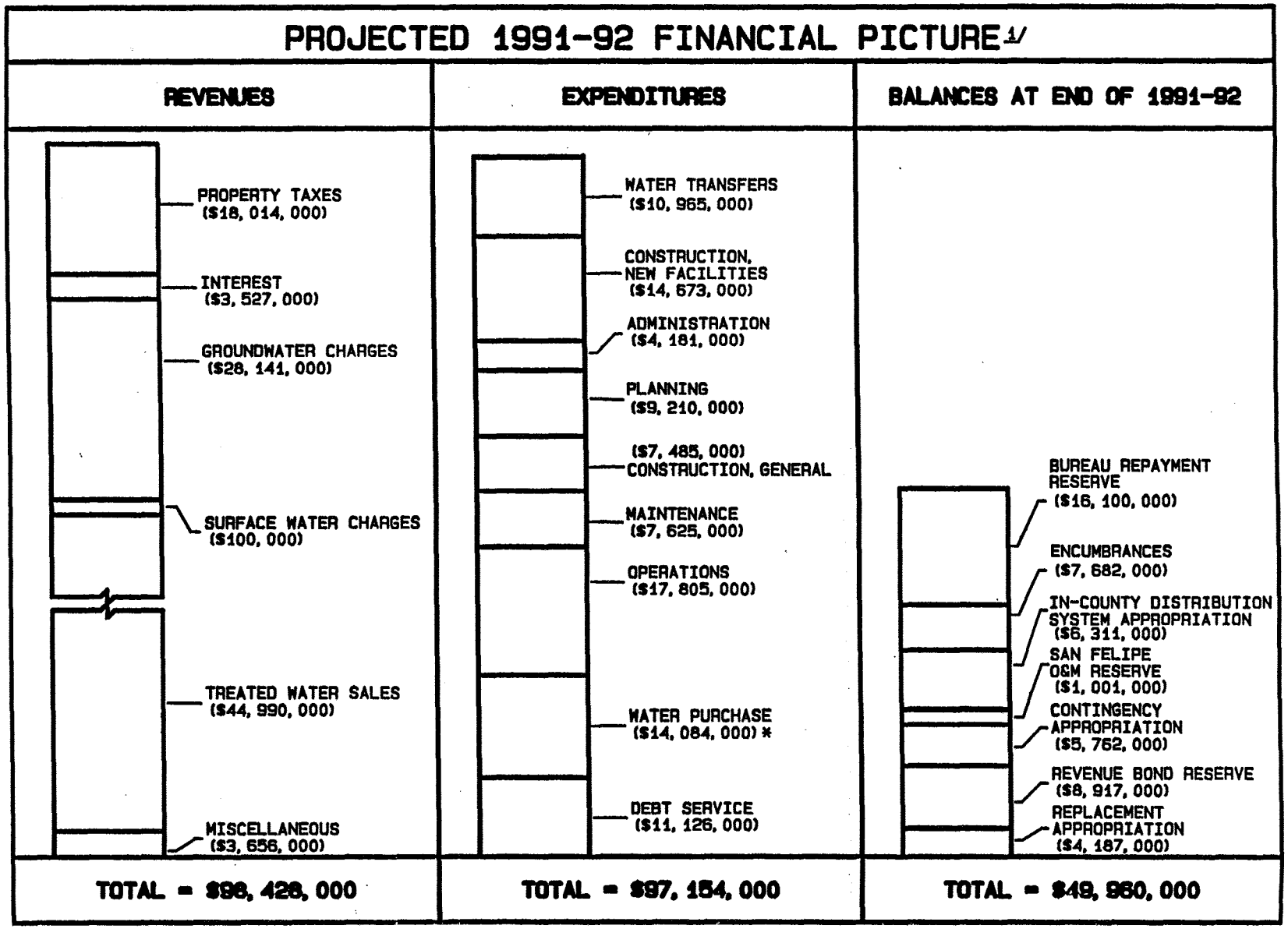


PROJECTED 1991-92 FINANCIAL PICTURE 1/



1/ ESTIMATED IN FEBRUARY 1991

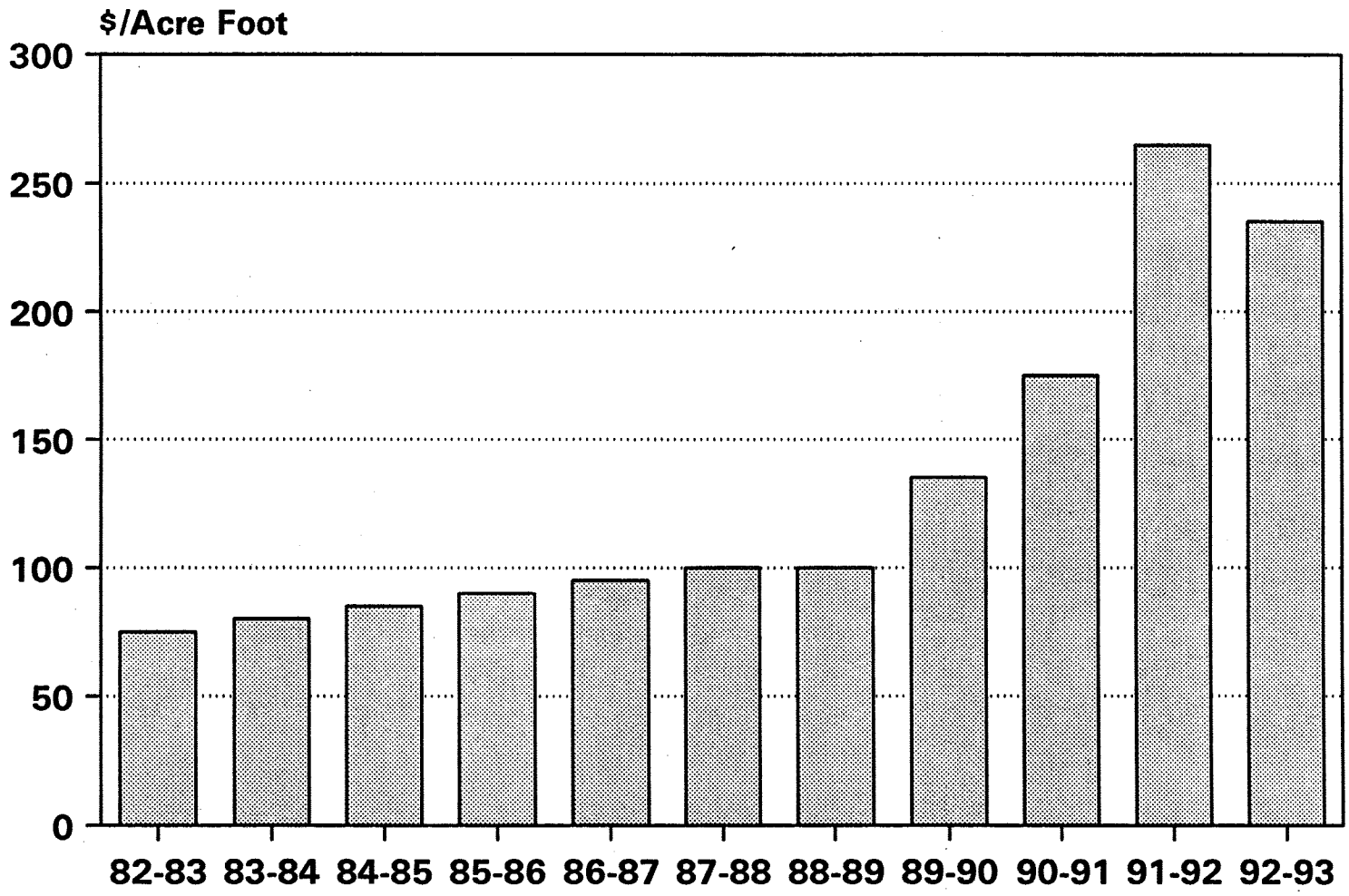
$1. million Transfer
$360 Basic User Rate in Zone W-2
$165 Basic User Rate in Zone W-5



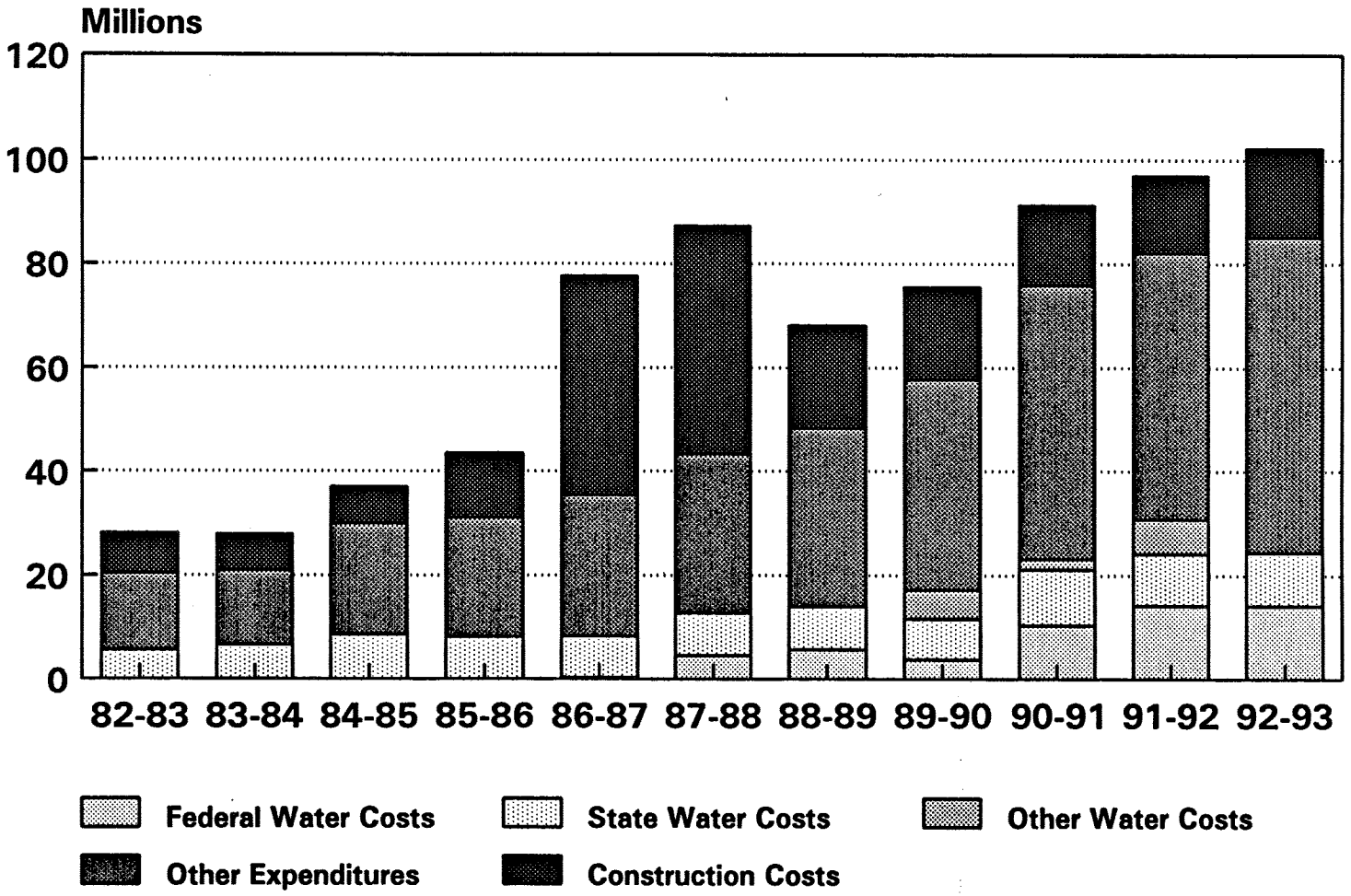
1/ ESTIMATED IN APRIL 1991

*15% OF ENTITLEMENT FROM STATE

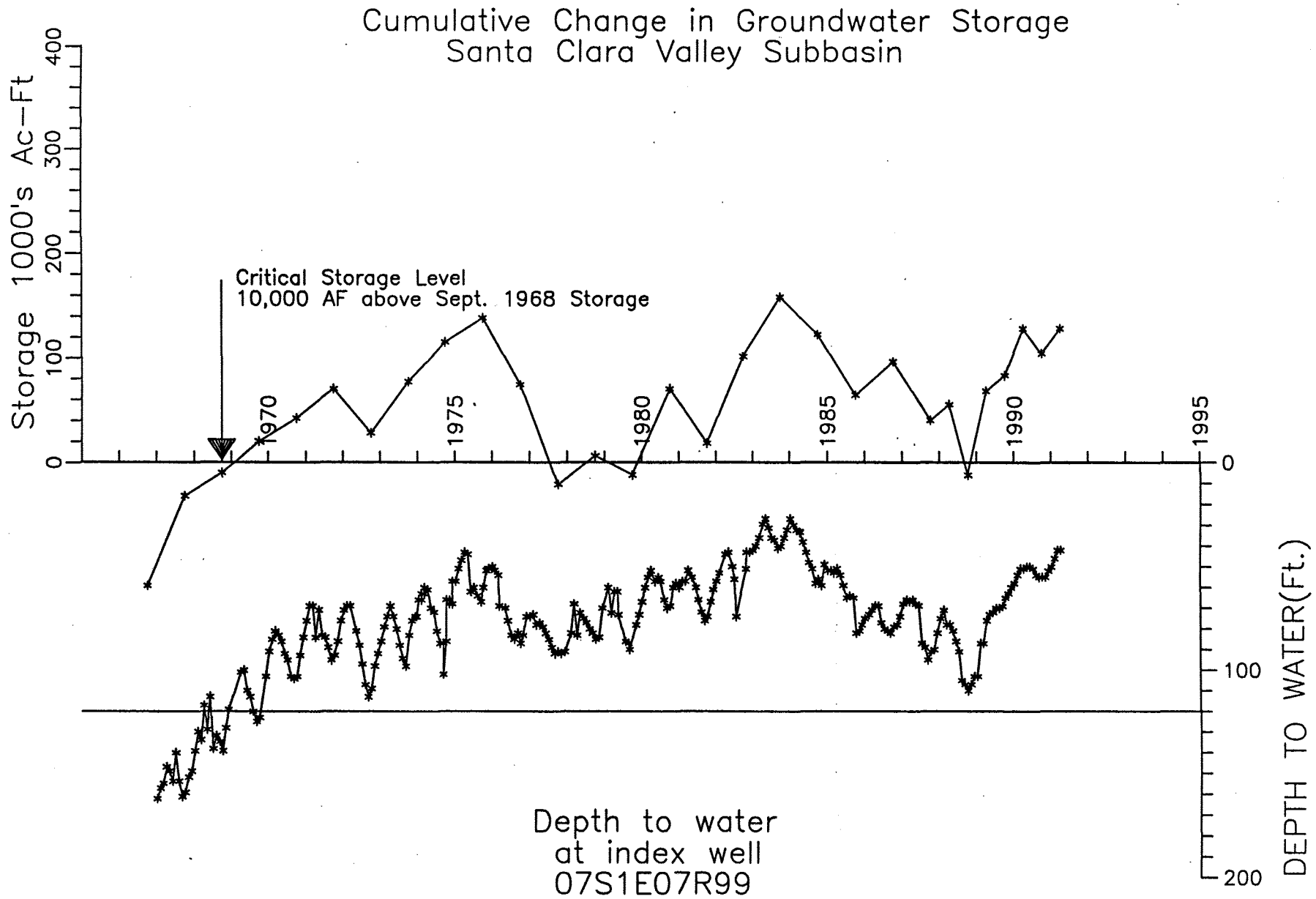
Zone W-2 Basic User Charge



STATE, FEDERAL, AND TOTAL EXPENDITURES



DROUGHT MANAGEMENT


Cumulative Change in Groundwater Storage
Santa Clara Valley Subbasin
Storage 1000's Ac-Ft
0
100
200
300
400
Critical Storage Level
10,000 AF above Sept. 1968 Storage
1970
1975
1980
1985
1990
1995
0
100
200
DEPTH TO WATER(Ft.)
Depth to water
at index well
07S1E07R99

MANAGEMENT ALTERNATIVES

Water use reductions: Voluntary, Mandatory

Most efficient distribution through plants
Protect groundwater basin
- Encourage treated water
  - Reduce treated water surcharge
  - Request retailers to use treated water
- Overproduction charges on groundwater

Purchase transfer water

Encourage reclaimed water

1992 MASTER PLAN

WATER MANAGEMENT PLAN

SUPPLY

Reclaimed water
Efficient use of water
Water transfers
Drought contingency
Groundwater basin management

WATER MANAGEMENT PLAN

QUALITY

Water treatment plant improvements
Disinfection by-products action plan
Wellhead protection
Watershed management
Non-point source control

WATER MANAGEMENT PLAN

SECURITY

Redundancy
Adequate storage
Disaster preparedness